

NATURAL HISTORY MISCELLANEA

Published by

The Chicago Academy of Sciences

Lincoln Park - 2001 N. Clark St., Chicago 14, Illinois

No. 79

February 21, 1951

Larval Ambystomid Salamanders from Southern Arizona and Sonora

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Arizona has only one salamander, *Ambystoma tigrinum*, but its range is considerably greater than that indicated on the map in Bishop's handbook (1943, map 20), since these animals are probably found over the greater part of the mountain and plateau country north of the Gila River, or two-thirds of the area of the state. The one possible record south of the Gila River is that of Cope's "Bonita Canyon" (Cope, 1889, p. 84) if he was referring to the Bonita Creek in the Graham Mountains, but since there is another Bonita Creek as well as a Bonito Creek in the state, both north of the Gila River, this record must remain in question. Dunn (1940) speaks of salamanders in "southern Arizona" but a careful reading of his paper has convinced me that he is considering only the southern part of the range as outlined above.

It was thus with great interest that during the summer of 1949 I learned from Jewel Trask, a former student of mine at the University of Arizona, that salamanders were common in certain pools in the Huachuca Mountains, near the Mexican border. In fact he had presented one of these salamanders, a large larva, to the university several years before, but it had been filed away in a collection and little notice taken of it. Trask and I made plans to get more of these salamanders, but he was unfortunately killed in an automobile accident a week later, and it was not until June 27, 1950, that I was able to visit the locality to which he had directed me. This locality is the J. A. Jones ranch, approximately 25 miles northeast of Patagonia and 3.5 miles north of the Mexican border, at an elevation of about 5000 ft., in Parker Canyon, on the west side of the Huachuca Mountains, Santa Cruz County, Arizona. Mr. Jones very kindly took me to the same pool where Trask had collected his original specimen, and there a single tow with a 10-foot seine netted 243

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larval *Ambystoma tigrinum*; indeed these animals are a pest in the pools and wells of the region. Further search, however, yielded no adults, although Mr. Jones stated positively that the larger ones lose their external gills and come out on land; furthermore, these animals rather quickly establish themselves in any new artificial pools (locally called "tanks") no matter where these are dug, which would indicate that overland travel is possible. Very probably, thus, at least some of these *Ambystoma* do undergo metamorphosis, and further collecting should produce adults, although neotinous individuals may also be found; Trask's original specimen may have been such an example.

Of the specimens collected by me, twenty picked at random had a total length ranging between 101 mm. and 78.5 mm. (mean 89.7 mm.); the snout-vent length for the same series was 54.5 mm. to 40.0 mm. (mean 46.9 mm.).

Although no subspecific name can be assigned to these young larvae, they did not appear to differ from slightly older larvae of *A. tigrinum* collected at Flagstaff, Arizona, and in the collection of the Museum of Vertebrate Zoology, Berkeley, California. The 243 individuals collected by me were divided into five jars; of these, one was given to Dr. F. A. Shannon of Wickenburg, Arizona, one to the Museum of Vertebrate Zoology, and three to the Chicago Natural History Museum.

Although there is no published report of salamanders from Sonora, to the south in Mexico, it is probable that the population discussed above extends into Sonora. In this regard, the Museum of Zoology of the University of Michigan has kindly permitted me to record here that they have 58 larval *Ambystoma* from Sonora, collected by Dr. Berry Campbell in the summer of 1935 in the area of the El Tigre and Santa Maria mines (approximately lat. 30°-31° and long. 109°-110°). It is possible that *Ambystoma* may be more common throughout the mountains of southern Arizona and northern Sonora than now known.

A study of these scattered and presumably isolated populations should yield data contributing to micro-evolutionary studies, as the time of isolation of these groups can now be dated fairly accurately as not less than 4500 nor more than 5500 years, or since the beginning of Antevis' "Altithermal" period (Antevis, 1948), which marks the beginning of the present cycle of dessication in the southwest. Although Antevis in 1948 estimated the beginning of the Altithermal as approximately 7000 years ago, more recent evidence, using the C¹⁴ method of dating late Quaternary organic remains (Arnold and Libby, 1950) would indicate that Antevis' general time-estimates for late Pleistocene and Recent climatic sequences in North America would have to be reduced (if Arnold and Libby's dates for the Tazewell and Mankato glacial substages are accurate). In correlation with this general shortening of

post-Pleistocene time, Antevs' estimates for the duration of the climatic changes accompanying the Sulphur Springs, Chiricahua, and San Pedro stages of the Cochise culture in southern Arizona (Sayles and Antevs, 1941) have also been reduced (Arnold and Libby, 1950), and consequently a present estimate of 4500-5500 years as the probable period of isolation for mountain salamanders in southern Arizona and northern Sonora is considered conservative by the present author.

For the success of the collecting here reported I am greatly indebted to the J. A. Jones family, whose cooperation was wholehearted and enthusiastic, and to Manuel Kaplan, Harvard medical student, who assisted with the collecting. My primary debt of gratitude to Jewel Trask can never be repaid.

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